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C O N F I D E N T I A L SECTION 01 OF 22 NEW DELHI 22414

VIENNA FOR UNVIE, DEPT PASS DOE

E.O. 12356: DECL:OADR
TAGS: ENRG, TROY, KPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

REFS: (A) NEW DELHI 19918 (NOTAL); (B) NEW DELHI 17968 NOTAL; (C) NEW DELHI 11762 (NOTAL); (D) NEW DELHI 10875 (NOTAL); (E) NEW DELHI 10249 NOTAL; (F) NEW DELHI 10511 (NOTAL); (G) NEW DELHI 9061 (NOTAL); (H) NEW DELHI 6776 (NOTAL); (I) 85 NEW DELHI 21704 (NOTAL).

1. CONFIDENTIAL ENTIRE TEXT.

2. SUMMARY. INDIA TODAY CONSUMES OVER 150 BILLION KILOWATT HOURS (KWH) OF ELECTRICITY OF WHICH NUCLEAR POWER PROVIDES ABOUT THREE PERCENT (ALMOST FIVE BILLION KWH). BY THE YEAR 2000, PROJECTIONS BY THE DEPARTMENT OF ATOMIC ENERGY (DAE) SEE CONSUMPTION ALMOST TRIPLING, TO 400 BILLION KWH, AND NUCLEAR POWER PLANTS PROVIDING TEN PERCENT OF THAT POWER, 40 BILLION KWH.

3. INDIA'S 15 YEAR NUCLEAR POWER PROGRAM CALLS FOR INSTALLED NUCLEAR POWER GENERATION CAPACITY TO INCREASE FROM TODAY'S 1,230 MW IN SIX REACTORS TO 10,000 MW IN 38 REACTORS BY THE YEAR 2000. (THIS IS THE SAME GOAL THAT CHINA RECENTLY ABANDONED.) DAE OFFICIALS ARE CONFIDENT OF ACHIEVING THIS GOAL PROVIDING THEY GET THE NECESSARY FUNDS. (THE GOI IS ENCOURAGING DAE TO USE NONGOVERNMENTAL FUNDS TO HELP REACH THE GOAL.) PROBLEMS OF HEAVY WATER PRODUCTION, CONSTRUCTION DELAYS, LOW QUALITY MANUFACTURED MATERIAL, LOW URANIUM PRODUCTION (ONLY ONE OPERATIONAL MINE NOW BUT FOUR PLANNED BY THE END OF THE DECADE), AND SAFETY WILL ALL BE SOLVED IN TIME, THEY BELIEVE. INDIA HAS BUILT AN IMPRESSIVE ESTABLISHMENT OF BASIC AND APPLIED RESEARCH, PROGRAM DESIGN AND DEVELOPMENT, AND MANAGEMENT ORGANIZATIONS. INDIA HAS THE LARGEST BODY OF NUCLEAR SCIENTISTS AND ENGINEERS IN THE DEVELOPING WORLD, OVER 21,500

4. THE DAE 86-87 BUDGET HAS INCREASED FIVE PERCENT OVER LAST YEAR TO OVER 750 MILLION DOLLARS. ESTIMATED DAE REVENUE FROM NUCLEAR POWER ARE [illegible] ADDITIONAL REVENUE COULD BE RAISED BY [illegible] CHARGES, WHICH ARE [illegible]

5. INDIA MADE IMPORTANT SCIENTIFIC STRIDES BUT ALSO SUFFERED MAJOR OPERATIONAL SETBACKS IN ITS NUCLEAR PROGRAM IN 1985-86. ON THE POSITIVE SIDE, THE FAST BREEDER TEST REACTOR (FBTR), THE SECOND POWER STATION AT KALPAKKAM (MAPS II), AND THE EXPERIMENTAL REACTOR DHRUVA ALL WENT CRITICAL. INDIA BECAME THE WORLD'S SEVENTH COUNTRY TO BEGIN OPERATING A BREEDER REACTOR. THE TARAPUR POWER STATIONS CONTINUED TO OPERATE WELL ALBEIT AT A DERATED 160 MW. THE BARODA HEAVY WATER PLANT INCREASED PRODUCTION FOR THE THIRD YEAR IN A ROW AND IT SEEMS THAT THE KAKRAPAR, THAL, AND MANUGURU PLANTS ARE STILL ON SCHEDULE. THE NAMINI RESEARCH REACTOR MAY BE COMMISSIONED BY THE END OF THE YEAR. DAE OFFICIALS HAVE BEEN CONDUCTING SIGNIFICANT RESEARCH INTO NUCLEAR FUELS AND HOPE EVENTUALLY TO FUEL THEIR POWER REACTORS WITH THORIUM-PLUTONIUM FUEL RATHER THAN URANIUM.

6. ON THE NEGATIVE SIDE, AN EXPLOSION AND FIRE SHUT DOWN THE TALCHER HEAVY WATER PLANT IN APRIL. IN AUGUST, DAE OFFICIALS GAVE UP ATTEMPTING TO REPAIR THE FIRST RAJASTHAN REACTOR (RAPS I). THE FIRST KALPAKKAM REACTOR (MAPS I) WAS OUT FOR FOUR MONTHS WHILE ITS GENERATOR TRANSFORMER WAS REPLACED. BEFORE IT WAS OPERATING AGAIN, A FUEL TANK LEAK CONTAMINATED SEVEN TONS OF ITS HEAVY WATER. DAE OFFICIALS PUBLICLY RECOGNIZED THAT DHRUVA HAS NOT WORKED NEARLY FROM ITS INCEPTION. ASPARA IS SHUT DOWN, AND CIRUS IS OPERATING AT HALF POWER.

7. ALTHOUGH THE UNITED STATES IS NOT PROVIDING ANY ASSISTANCE TO INDIA'S NUCLEAR ENERGY PROGRAM, INDIA DOES HAVE CONTACTS WITH WESTERN EUROPEAN COUNTRIES

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AND WITH JAPAN. DAE IS ABLE TO OBTAIN RELATED, THOUGH NOT DIRECT NUCLEAR, TECHNOLOGY (E.G., ELECTRONICS SYSTEMS) FROM THESE ADVANCED COUNTRIES WHEN THE UNITED STATES DOES NOT PROVIDE ASSISTANCE.

8. DAE OFFICIALS VEHEMENTLY DENIED RECENTLY PUBLISHED CHARGES THAT INDIA WAS ACQUIRING A NUCLEAR WEAPONS CAPABILITY, THAT SAFEGUARDED HEAVY WATER HAD BEEN ILLEGALLY DIVERTED TO UNSAFEGUARDED REACTORS, AND THAT INDIA WAS IMPORTING HEAVY WATER FROM CHINA. THEY ALSO CONTINUED TO PROVIDE POST-CHERNOBYL SAFETY ASSURANCES STRESSING THAT, "IT CAN'T HAPPEN HERE." END SUMMARY.

9. THIS REPORT IS DIVIDED INTO THE FOLLOWING SECTIONS.

-- INDIA'S ENERGY NEEDS

-- INDIA'S NUCLEAR POWER STRATEGY

-- DEPARTMENT OF ATOMIC ENERGY

-- DAE BUDGET

-- NUCLEAR POWER COSTS

-- NUCLEAR POWER PLANTS

-- HEAVY WATER PLANTS

-- FAST BREEDER REACTORS

-- RESEARCH REACTORS

-- REPROCESSING

-- RADIOACTIVE WASTE MANAGEMENT

-- NUCLEAR RESEARCH

-- SAFETY

-- NSG & U.S. NUCLEAR COOPERATION

-- COMMENT

10. EMBASSY ACKNOWLEDGES AND APPRECIATES AMCONGEN BOMBAY'S ASSISTANCE IN THE INITIAL PREPARATION OF THE REPORT. THE EMBASSY WILL UPDATE THIS REPORT ANNUALLY. WE ARE ALSO PREPARING A COUNTRY WIDE ASSESSMENT OF THE ELECTRIC POWER SITUATION IN INDIA AS AN UPDATE OF 84 NEW DELHI 02731.

INDIA'S ENERGY NEEDS

11. INDIA TODAY CONSUMES OVER 150 BILLION KILOWATT HOURS (KWH) OF ELECTRICITY ANNUALLY AND THAT FIGURE IS INCREASING. BY THE YEAR 2000, DAE PROJECTIONS SEE CONSUMPTION AS ALMOST TRIPLING, TO 400 BILLION KWH. THIS, HOWEVER, IS ONLY PART (ABOUT 20 PERCENT) OF INDIA'S ENERGY CONSUMPTION. COMMERCIAL ENERGY REQUIREMENTS OF TWICE THIS AMOUNT ARE MET BY SOURCES OTHER THAN ELECTRICITY. NON COMMERCIAL SOURCES OF ENERGY (FIREWOOD, DUNG, MANUAL AND ANIMAL LABOR, AGRICULTURAL WASTE) PROVIDE THE REMAINING 40 PERCENT OF INDIA'S TOTAL ENERGY REQUIREMENTS.

12. VARIOUS GOI AND DAE PROJECTIONS ESTIMATE THAT INDIA'S INSTALLED ELECTRICAL GENERATING CAPACITY SHOULD INCREASE FROM TODAY'S 45,000 MW TO 100,000 OR 120,000 MW BY THE YEAR 2000 IN ORDER TO MEET THE COUNTRY'S EVER INCREASING COMMERCIAL ENERGY NEEDS. THERE ARE ONLY THREE PRINCIPAL SOURCES OF ENERGY IN INDIA WHICH CAN BE EXPECTED TO PLAY MAJOR ROLES ON A COMMERCIAL SCALE FOR GENERATING ELECTRICITY:

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HYDRO-ELECTRIC, COAL, AND NUCLEAR.

13. OIL AND NATURAL GAS, THOUGH USED EXTENSIVELY FOR TRANSPORTATION, FOR HOME COOKING AND LIGHTING, AND IN THE PETRO-CHEMICAL INDUSTRY, ARE NOT USED MUCH FOR GENERATING ELECTRICITY IN INDIA. INDIA IS EXPECTED TO NEED 90 MILION TONS OF PETROLEUM ANNUALLY BY THE YEAR 2000 OF WHICH ONLY 50 TO 67 PERCENT WILL BE DOMESTICALLY PRODUCED. EVEN IF NATURAL GAS FIELDS ARE DEVELOPED EXTENSIVELY, THE NATURAL GAS IS EXPECTED
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TO BE BURNED DIRECTLY RATHER THAN USED TO GENERATE ELECTRICITY. ON THESE GROUNDS, GOI PLANNERS RULE OUT USING PETROLEUM AND NATURAL GAS TO GENERATE MUCH ELECTRICITY FOR THE COUNTRY.
14. HYDRO-ELECTRIC POWER IS THE ONLY AVAILABLE RENEWABLE RESOURCE OF ENERGY FOR BULK ELECTRICITY GENERATION: INDIA HOPES TO EXPLOIT IT TO THE GREATEST EXTENT POSSIBLE. BUT HYDRO-ELECTRIC PLANTS CAN BE CONSTRUCTED ONLY AT SPECIFIC LOCATIONS, THEY INVOLVE HIGH CAPITAL COSTS, AND THEY HAVE LONG GESTATION PERIODS RESULTING FROM THEIR BEING MULTIPURPOSE HYDRO-AGRICULTURAL OPERATIONS. NEW HYDRO-ELECTRIC PROJECTS ARE ALSO ENCOUNTERING ENVIRONMENTAL AND POLITICAL DIFFICULTIES DUE TO THEIR SUBMERGING FORESTED AREAS AND UPROOTING
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LARGE NUMBERS OF PEOPLE. OF THE 75,000 MW OF HYDRO-ELECTRIC POTENTIAL IN INDIA, ONLY 20 PERCENT HAS BEEN EXPLOITED SO FAR. PLANS CALL FOR THIS TO BE DOUBLED WITHIN THE NEXT 15 YEARS.

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15. AT PRESENT, COAL IS INDIA'S MAJOR SOURCE FOR GENERATING ELECTRICITY PRODUCING MORE THAN 60 PERCENT OF THE COUNTRY'S ELECTRICITY. COAL WILL CONTINUE TO PLAY A MAJOR ROLE IN THE FUTURE. BY THE YEAR 2000, THE INSTALLED CAPACITY OF COAL-FIRED ELECTRICITY PLANTS IS EXPECTED TO DOUBLE TO 50,000 MW OF THERMAL POWER. BUT THERE ARE CONSTRAINTS ON THE USE OF COAL AND THESE CONSTRAINTS WILL SERVE TO REDUCE THE SHARE OF ELECTRICITY GENERATED BY COAL.

16. ONLY ONE-FOURTH (LESS THAN 30 BILLION TONS) OF INDIA'S COAL RESERVES ARE PROVEN, THE REST ARE EITHER INFERRED OR INDICATED. THE QUALITY OF INDIAN COAL IS

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VERY POOR, CONTAINING 35 PERCENT OR MORE OF ASH AND NONCOMBUSTIBLES. MOST OF THE NEW THERMAL PLANTS WILL HAVE TO BE LOCATED NEAR THE MINES IN BIHAR AND MADHYA PRADESH TO MINIMIZE TRANSPORTATION AND ENVIRONMENTAL COSTS. FURTHER, ACCORDING TO DAE FIGURES, A 1000 MW THERMAL STATION OPERATING AT 60 PERCENT CAPACITY WILL NEED OVER 10,000 TONS OF COAL DAILY (FIVE TO SEVEN TRAINLOADS), WILL PRODUCE OVER ONE MILLION TONS OF ASH EACH YEAR, AND WILL DISCHARGE 50 TONS OF POISONOUS SULPHUR DIOXIDE DAILY.

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17. IT IS AGAINST THIS BACKGROUND THAT THE DAE PROPOSED A 15 YEAR NUCLEAR POWER PROGRAM FOR INDIA, A PROGRAM IN WHICH 10,000 MW OF NUCLEAR GENERATING CAPACITY IS TO BE INSTALLED BY THE YEAR 2000. (THE 10,000 MW GOAL IS PART OF THE OVERALL PLAN TO PROVIDE ENOUGH PLUTONIUM FOR A SELF-SUSTAINING BREEDER CYCLE DURING THE SECOND PHASE OF INDIA'S NUCLEAR POWER PROGRAM.) BECAUSE INDIAN HYDRO-ELECTRIC, THERMAL, AND NUCLEAR PLANTS REQUIRE EIGHT TO FIFTEEN YEARS FROM THE DESIGN STAGE TO BECOME FULLY OPERATIONAL, INDIA MUST PLAN NOW FOR THE ELECTRICIT IT HOPES TO HAVE BY THE YEAR 2000.

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INDIA'S NUCLEAR POWER STRATEGY

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18. INDIGENIZATION, OR SELF-RELIANCE, IN DEVELOPING INDIAN NUCLEAR POWER GENERATION IS THE GOI GOAL. INDIA IS WORKING TOWARD MAXIMUM NATIONAL SELF-SUFFICIENCY IN MASTERING THE ENTIRE NUCLEAR CYCLE -- FROM MINING TO WASTE DISPOSAL.

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19. INDIA'S NUCLEAR POWER BOARD (NPB) OPERATES SIX
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NUCLEAR REACTORS HAVING A COMBINED CAPACITY OF 1,238 MW. THESE ARE LOCATED AT TARAPUR (TAPS -- TWO REACTORS AT 210 MW EACH), RAJASTHAN (RAPS -- TWO REACTORS AT 220 MW EACH), AND KALPAKKAM, NEAR MADRAS, (MAPS -- TWO REACTORS AT 220 MW EACH). INSTALLED CAPACITY IS EXPECTED TO INCREASE TO 1,700 MW BY 1990 AND TO 2,170 MW BY 1992. BY 1995, REACTORS NOW UNDER CONSTRUCTION SHOULD HAVE A CAPACITY OF 3,110 MW. BY 1996, INSTALLED CAPACITY IS SUPPOSED TO REACH 5,000 MW AND BY THE YEAR 2020, THE GOI PLANS TO HAVE 10,050 MW OF INSTALLED NUCLEAR POWER GENERATION CAPACITY IN 30 REACTORS (12 ADDITIONAL REACTORS AT 235 MW EACH AND 10 REACTORS AT 500 MW EACH).

20. DURING 1985-86, INDIA'S POWER REACTORS GENERATED ALMOST FIVE BILLION KILOWATT HOURS (KWH) OF ELECTRICITY, UP FROM 3.5 BILLION TWO YEARS EARLIER. FROM MEETING ABOUT THREE PERCENT OF INDIA'S ELECTRICITY NEEDS NOW, GOI OFFICIALS BELIEVE NUCLEAR POWER WILL MEET TEN PERCENT OF INDIA'S ELECTRICITY NEEDS IN THE YEAR 2000. GOI AND DAE OFFICIALS CONTINUE TO REMAIN PUBLICLY OPTIMISTIC ABOUT ATTAINING THIS GOAL IN SPITE OF ITS ACCOMPANYING HEAVY FINANCIAL COSTS, CONSTRUCTION DELAYS, OPERATIONAL PROBLEMS, AND PERIODIC PRESS CRITICISM. WE SUSPECT, HOWEVER, THAT THEIR GOAL IS TOO AMBITIOUS.

21. DAE OFFICIALS CONSISTENTLY ARGUE THAT THERE IS AN ACHIEVABLE GOAL. WHETHER OR NOT IT IS REACHED, THEY SAY, DEPENDS LARGELY ON THE FOLLOWING FACTORS:

-- (A) WILL ENOUGH MONEY BE ALLOCATED TO PAY FOR THE NEW PLANTS?

-- (B) WILL INDIA BE ABLE TO OVERCOME HER HEAVY WATER PLANT [illegible]?

-- (C) AS THE PEACE M CONTINUES AND THEY GET MORE EXPERIENCE, WILL THE INDIAN MANUFACTURERS BE ABLE TO PRODUCE HIGH QUALITY EQUIPMENT ON TIME?

22. DURING THE EARLY YEARS OF INDIA'S NUCLEAR PROGRAM, DESPITE CENTRAL GOVERNMENT [illegible] THE GOI HAS ALLOWED THE NPC FLEXIBILITY TO FLOAT BONDS AND TO RAISE ITS ELECTRICITY TARIFF RATES TO INCREASE ITS AVAILABLE FUNDS. THE GOI DOES NOT WANT TO CONTINUE SUBSIDIZING EITHER NUCLEAR GENERATED ELECTRICITY OR THE NPC'S MASSIVE CONSTRUCTION COST [illegible]. WHEN THIS HAS BEEN DONE, INDIA'S HEAVY WATER PROBLEMS WILL BE OVERCOME. HEAVY WATER PRODUCTION WILL CERTAINLY INCREASE, THOUGH, IF ONLY BECAUSE MORE AND LARGER PLANTS ARE BEING BUILT INCORPORATING DESIGN AND OPERATING CHANGES TO (HOPEFULLY) ELIMINATE PROBLEMS ASSOCIATED WITH EXISTING HEAVY WATER PLANTS.

23. WITH REGARD TO THE THIRD POINT, DAE CHAIRMAN DR. RAJA RAMANNA HAS EMPHASIZED HIS EXPECTATION THAT INDIAN MANUFACTURERS WILL BE INCREASINGLY ABLE TO PUT OUT QUALITY PRODUCTS ON TIME AS INDIA'S NUCLEAR PROGRAM PROGRESSES. THESE MANUFACTURERS WILL BE HELPED, HE FEELS, BY INCREASING NUMBERS OF ORDERS, STANDARDIZED POWER PLANT DESIGN (235 MW AND 500 MW REACTORS ONLY), ADVANCED PROCUREMENT OF CRITICAL MATERIAL, PREFABRICATED MATERIALS, ON-SITE CONSTRUCTION, AND CONTINUING COHERENCE TO HIGH QUALITY STANDARDS. THESE CRITERIA LEAD HIM AND OTHERS TO PREDICT INCREASINGLY FEWER POST-COMMISSIONING PROBLEMS. RAMANNA NOTED RECENTLY THAT MOST NUCLEAR PLANT SHUTDOWNS ARE DUE TO CONVENTIONAL, NOT NUCLEAR ITEMS. HE SAID DAE HAD TO BUY WHAT IT COULD GET IN INDIA AND THAT QUALITY IMPROVEMENT CONTINUED AS THEY TOLD THE MANUFACTURERS WHAT WAS WRONG WITH THEIR PRODUCTS. RAMANNA CITED THE NARRAPAR NUCLEAR POWER STATION AND THE THAL AND MANUGURU HEAVY WATER PLANTS, WHICH HE SAID WOULD BE COMPLETED ON OR AHEAD OF SCHEDULE, AS EVIDENCE THAT MAJOR DELAYS IN COMMISSIONING ARE THINGS OF THE PAST

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SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

24. OTHER FACTORS WHICH COULD IMPINGE ON ACHIEVING THE GOAL OF 10,000 MW BY THE YEAR 2000 ARE THE NEED TO INCREASE URANIUM PRODUCTION (NOW AT 130 TONS PER YEAR) AND THE AVAILABILITY OF TRAINED MANPOWER TO (CORRECTLY AND SAFELY) OPERATE THE INCREASING NUMBER OF NUCLEAR POWER STATIONS. THE GOI ESTIMATES INDIA'S URANIUM RESERVES AT 73,900 TONS INDICATED AND INFERRED. MAJOR DEPOSITS ARE IN BIHAR, MADHYA PRADESH, KARNATAKA, RAJASTHAN, AND MEGHALAYA. BY THE END OF THE DECADE, THE URANIUM CORPORATION OF INDIA EXPECTS TO HAVE FOUR MINES IN OPERATION (VS ONE NOW) IN ADDITION TO A URANIUM RECOVERY PLANT TO EXTRACT URANIUM FROM COPPER TAILINGS FROM HINDUSTAN COPPER LIMITED.

25. MANPOWER SHOULD NOT BE A PROBLEM. AT PRESENT, DAE HAS ALMOST 32,500 STAFF OF WHICH OVER 21,500 ARE SCIENTISTS AND TECHNICIANS. THIS LAST GROUP HAS BEEN GROWING AT ABOUT THREE PERCENT ANNUALLY; MANY ARE TOP QUALITY PEOPLE. A GOOD MANY OF THE LEADERS HAVE BEEN EDUCATED IN EUROPE, THE UNITED STATES, OR AT ONE OF INDIA'S IITS.

DEPARTMENT OF ATOMIC ENERGY

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26. DR. RAJA RAMANNA, ATOMIC ENERGY COMMISSION (AEC) CHAIRMAN AND DAE SECRETARY IS STILL FULLY IN CHARGE OF THE DEPARTMENT OF ATOMIC ENERGY WITH OVER [illegible] PERSONNEL. IT CONSISTS OF SEVERAL SUBDIVISIONS. THE NUCLEAR POWER BOARD (NPB) OVERSEES THE PRESENT AND FUTURE NUCLEAR POWER PROJECTS. THE HEAVY WATER PROJECTS SECTION, HEADED BY MR. N. [illegible], OVERSEES ALL THE HEAVY WATER PLANTS AND PROJECTS. ADDITIONAL BOARDS OF DAE INCLUDE THE NUCLEAR FUEL COMPLEX (NFC) AND THE ATOMIC MINERALS DIVISION (AMD) WHICH [illegible]

UNDERTAKINGS (INDIAN RARE EARTHS LIMITED, URANIUM CORPORATION OF INDIA LIMITED, AND ELECTRONICS CORPORATION OF INDIA LIMITED). DAE ALSO RUNS THE BHABHA ATOMIC RESEARCH CENTER (BARC), THE INDIRA GANDHI CENTER FOR ATOMIC RESEARCH (IGCAR), AND THE CENTER FOR ADVANCED TECHNOLOGY (CAT) AND OTHER INSTITUTES.

28. THE ATOMIC ENERGY COMMISSION, OF WHICH DR. RAMANNA IS THE CHAIRMAN, IS A NINE PERSON BODY WHICH ADVISES THE GOI ON ATOMIC ENERGY MATTERS. MR. SHIVRAJ PATIL, MINISTER OF STATE FOR SCIENCE AND TECHNOLOGY, ATOMIC ENERGY, SPACE, ELECTRONICS, AND OCEAN DEVELOPMENT, OVERSEES THE OPERATION OF DAE AND ANSWERS PARLIAMENTARY QUESTIONS RELATING TO ATOMIC ENERGY MATTERS.

DAE BUDGET

(ALL DOLLAR FIGURES IN THIS AND SUCCEEDING SECTIONS ARE FIGURED AT USDOLS 1.00 RS. 12.581)

29. THE INDIAN NATIONAL PLAN BUDGET FOR 1986-87 (APRIL 1-MARCH 31) PROVIDES APPROXIMATELY DOLLARS 440 MILLION FOR THE DEPARTMENT OF ATOMIC ENERGY, A FIVE PERCENT INCREASE OVER THE 1985-86 REVISED BUDGET ESTIMATES. THE NUCLEAR POWER ALLOCATION OF 175.5 MILLION DOLLARS REPRESENTS A 24 PERCENT INCREASE WHILE THE HEAVY WATER PROJECT ALLOCATION OF DOLLARS 130 MILLION SHOWS AN 18 PERCENT DECREASE. THE RESEARCH AND DEVELOPMENT ALLOCATION OF DOLLARS 38.5 MILLION IS UP SIX PERCENT FROM LAST YEAR. THE PLAN BUDGET BREAKDOWN FOLLOWS.

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VIENNA FOR OFFICE; DEPT PASS DOE

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-1986-87 PLAN BUDGET FOR THE DEPARTMENT OF ATOMIC ENERGY

-- CATEGORY MILLIONS OF DOLLARS

- NUCLEAR POWER (INCLUDES ALL NUCLEAR POWER STATIONS AND ADVANCE PROCUREMENT) 175.54

- OTHER PROJECTS 24.39

--- TOTAL NUCLEAR POWER AND ENERGY 199.93

- BARC (INCLUDES REPROCESSING PLANTS AT TARAPUR AND RAJASTHAN) 34.72

- HEAVY WATER PROJECTS 129.73

- MINERALS (INCLUDES NUCLEAR FUEL COMPLEX, INDIAN RARE EARTHS, URANIUM CORPORATION, ETC.) 37.15

--- TOTAL INDUSTRY AND MINERALS 201.60

- RESEARCH AND DEVELOPMENT (INCLUDES BARC, CAT, RRC, ATOMIC MINERALS DIVISION AND OTHER) 38.47

---- TOTAL 440.00
(RS. 550 CRORE

39. IT APPEARS THAT PLAN MONEY, IN ADDITION TO THE DOLLARS 175.5 MILLION HAS BEEN BUDGETED FOR CAPITAL DISBURSEMENTS FOR THE NUCLEAR POWER STATIONS. IN THE EXPLANATORY MEMORANDUM ON THE CENTRAL GOVERNMENT BUDGET, PUT OUT BY THE MINISTRY OF FINANCE, THE FOLLOWING ADDITIONAL AMOUNTS ARE RECORDED DERIVED

-- MILLIONS OF DOLLARS

-- TARAPUR ATOMIC POWER STATION 4.22

-- RAJASTHAN ATOMIC POWER STATION 3.49

-- 500 MW FACILITY 2.31

-- WASTE MANAGEMENT FACILITIES 2.31

-- OTHER PROJECTS 4.65

--- MINIMUM TOTAL ADDITIONAL PLAN FUNDING 16.46

31. IN ADDITION TO THE PLAN BUDGET, THE ATOMIC ENERGY DEVELOPMENT PROGRAM ALSO RECEIVES NON-PLAN FUNDING. THE 86-87 GOI BUDGET ESTIMATES THIS NON-PLAN EXPENDITURE OF DOLLARS 67.8 MILLION TO BE OFFSET BY REVENUES AMOUNTING TO DOLLARS 56.4 MILLION. ADDITIONAL PROJECTED NON-PLAN FUNDING FOR THE THREE ATOMIC POWER PLANTS IS GIVEN BELOW.

-- MILLIONS OF DOLLARS

TARAPUR ATOMIC POWER STATION

-- EXPENDITURE 46.4

-- RECEIPTS (FROM SALE OF POWER) (57.6)

RAJASTHAN ATOMIC POWER STATION

-- EXPENDITURE 52.8

-- RECEIPTS (63.7)

MADRAS ATOMIC POWER STATION

-- EXPENDITURE 51.9

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INFO LOG-00 CGFY-01 ADS-00 INR-10 EUR-00 SS-00 OIC-02
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L-03 PM-10 [illegible] [illegible] [illegible] [illegible]
SNP-01 CEQ-01 /087 W

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P 1509462 SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5272
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

C O N F I D E N T I A L SECTION 07 OF 22 NEW DELHI 22414

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-- RECEIPTS (67.2)

32. A THIRD AMOUNT, AN ADDITIONAL DOLLARS 85.9 MILLION, IS PROVIDED IN THE BUDGET AS AN ESTIMATE OF NON-PLAN CAPITAL EXPENSES TOWARD ATOMIC ENERGY DEVELOPMENT. THIS ENTIRE AMOUNT OF MONEY IS ALLOCATED FOR EXISTING HEAVY WATER PLANTS. NO NON-PLAN CAPITAL EXPENDITURES HAVE BEEN BUDGETED FOR EXISTING OR FUTURE NUCLEAR POWER STATIONS.

33. THUS INDIA'S ATOMIC ENERGY PROGRAM SHOULD RECEIVE USDOLS 406.5 MILLION IN PLAN FUNDS DURING FY 1986-87 AND USDOLS 384 MILLION IN NON-PLAN FUNDS. THE NON-PLAN FUNDING IS EXPECTED TO BE COVERED BY REVENUES (USDOLS 248.6 MILLION) LARGELY FROM THE SALE OF NUCLEAR POWER.

NUCLEAR POWER COSTS

34. THE INSTALLED COST PER MEGAWATT (MW) AT TARAPUR WAS ABOUT 13 CENTS (RS. 1.6). ELECTRICITY FROM TAPS HAS BEEN SOLD AT LESS THAN 30 PAISA (100 PAISA PER RUPEE) PER KILOWATT HOUR (KWH); IT IS NOW UP TO ABOUT 3 CENTS (36 PAISA) BUT IS STILL LOWER THAN THE COST OF THERMAL POWER IN THE REGION (MORE THAN 3 1/2 CENTS (45 PAISA) PER KWH). THE INSTALLED COST AT RAPS WAS ABOUT 33 CENTS (RS. 4) PER KWH. ITS ELECTRICITY SELLS FOR AROUND 40 PAISA PER KWH VERSUS THE REGION'S THERMAL COST OF OVER 60 PAISA PER KWH, ABOUT 4 1/2 CENTS. RAPS ELECTRICITY SELLS FOR AROUND 35 PAISA VERSUS THERMAL COSTS OF OVER 5 CENTS OR 60 PAISA.

35. INDIAN CONSUMERS HAVE BEEN PAYING 1 PAISA PER KWH OR ELECTRICITY TODAY. DECOMMISSIONING COSTS OF [illegible] CAPITALIZED AT 1% PER YEAR OVER 30 YEARS, ONE PROJECT, THIS ONE CROSE RUPEES, COST [illegible] IF THE [illegible] BECOME 130 CRORE RUPEES, OR 104 MILLION AT CURRENT PRICES/RATES) AT THE END OF A REACTOR'S LIFE.

36. TOTAL REVENUES TO DATE FROM THE SALE OF [illegible], ACCORDING TO DAE [illegible], OF THE 217 NUCLEAR POWER PLANTS ARE OVER DOLS 600 MILLION (RS. 750 CRORE). ADDITIONAL INCOME OF 20-25 PERCENT OF THIS FIGURE IS EXPECTED ANNUALLY FOR THE NEXT FEW YEARS. IN CONTRAST, RAMANNA SAID THAT THEIR COMBINED FINAL TOTAL PROJECT COSTS WERE SOME DOLS 480 MILLION (600 CRORE RUPEES). HOWEVER, ADDING ANNUAL OPERATING COSTS, NOW EXCEEDING DOLS 100 MILLION AND CERTAINLY IN EXCESS OF DOLS 80 MILLION FOR THE PAST SEVERAL YEARS, CLEARLY SHOWS THAT NUCLEAR POWER IS A MONEY-LOSER FOR INDIA. DR. P.K. IYENGAR, BARC DIRECTOR, HAS STATED THAT HE BELIEVES INDIAN NUCLEAR POWER WILL BECOME PROFITABLE BY THE MID 1990'S.

NUCLEAR POWER PLANTS

37. FOLLOWING IS A LISTING OF INDIA'S PRESENT NUCLEAR POWER PLANTS AND THOSE UNDER CONSTRUCTION:

PLANT	DATE OF COMMISSIONING	DESIGN CAPACITY (MW)	EFFECTIVE CAPACITY (MW)
TAPS I	1969	210	160
TAPS II	1969	210	160

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L-03 PM-10 TAP-00 ACDA-12 SP-02 DOEE-00 NRC-02
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P 150948Z SEP 86
FM AMEMBASSY NEW DTLEI
TO SECSTATE WASHDC PRIORITY 5273
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS
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RAPS I	1972	220	NONE
RAPS II	1973	220	210
MAPS I	1984	235	220
MAPS II	1985	235	220
NAPP I	1988	235	220
NAPP II	1989	235	220
KAPP I	1991	235	220

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KAPP II	1992	235	220
KAIGA I	1994	235	--
KAIGA II	1995	235	--
RAPS III	1994	235	--
RAPS IV	1995	235	--

38. TARAPUR ATOMIC POWER STATION
(TAPS)--THIS "VINTAGE" OF-BUILT PLANT, NEAR BOMBAY,
WILL HAVE COMPLETED 17 YEARS OF COMMERCIAL
OPERATION ON NOVEMBER 1, 1986. DURING 1985,

TAPS II ACHIEVED AN AVAILABILITY FACTOR OF
82 PERCENT AND A CAPACITY FACTOR OF 84 PERCENT:
THE CORRESPONDING FIGURES FOR TAPS I WERE 71 AND
82 PERCENT. IN A JUNE 1986 PRESS INTERVIEW,
DR. SRINIVASAN, CHAIRMAN OF DAE'S NUCLEAR POWER
BOARD, SAID THAT THE TARAPUR REACTORS ARE
OPERATING AT 160 MW RATHER THAN AT THEIR
ORIGINAL DESIGN CAPACITY OF 210 MW. THESE

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UNITS WERE DERATED TO PREVENT LEAKS IN THE TUBES OF THE FACILITY'S FOUR STEAM GENERATORS. THESE LEAKS REAPPEARED REGULARLY. DESPITE REPAIRS, UNTIL IT WAS DISCOVERED THAT DERATING TO 160 MW ELIMINATED THE LEAKS. THIS REDUCTION MAY SOLVE THE TAPS REACTORS' PERSISTENT PROBLEM OF FUEL CONTAMINATION OF THE COOLANT. (UNDER STRESS, THE FUEL ROD CLADDING DEVELOPS PINHOLES SO THAT RADIOACTIVE FISSION PRODUCTS AND GASES LEAK OUT INTO THE COOLANT. THE CIRCULATING COOLANT, AND LEAKS BETWEEN THE PRIMARY AND SECONDARY COOLANT CHANNELS, SPREAD THE RADIOACTIVITY THROUGHOUT

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ALMOST THE ENTIRE PLANT.) STILL TO BE SOLVED ARE FREQUENT FAILURES OF ITS ELECTRIC GAUGES AND ITS ALARM AND CONTROL SYSTEMS.

39. TARAPUR FUEL AND SPARES SUPPLY NO LONGER CONSTITUTE INDO-US PROBLEMS. THE FRENCH HAVE SUPPLIED LOW-ENRICHED URANIUM SINCE 1983 AND INDIAN MANUFACTURERS ARE PROVIDING AN INCREASING NUMBER OF SPARE PARTS OFFSETTING THE LIMITED AVAILABILITY FROM THE ORIGINAL US AND FRG SUPPLIERS.

40. TARAPUR'S SPENT FUEL STORAGE POOL WAS AUGMENTED IN 1986 BY INSTALLING TWO MORE HIGH DENSITY STAINLESS STEEL RACKS. SINCE FURTHER AUGMENTATION OF THE POOL IS NOT POSSIBLE, AN AWAY-FROM-REACTOR (AFR) FUEL STORAGE FACILITY WILL BE BUILT TO FACILITATE REFUELING OF TAPS BEYOND 1986. THE DISPOSITION OF THIS SPENT FUEL CONTINUES TO BE A POSSIBLE ISSUE IN FUTURE INDO-US RELATIONS SINCE THE USG VIEW IS THAT ALL REPROCESSING MUST BE UNDER SAFEGUARDS BECAUSE THE REACTOR AND FUEL ARE SAFEGUARDED.

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42. RAJASTHAN ATOMIC POWER STATION (RAPS)--
RAPS I HAS CHRONIC PROBLEMS WITH AN END SHIELD
LEAK. (IT ALSO HAD FAILURES OF ITS
FUELING MACHINE, TURBINES, PIPELINES, VALVES.
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ACTION OES-09
INFO LOG-00 COPY-01 ADS-00 INR-10 EUR-00 SS-00 OIC-02
CIAE-00 FB-03 DODE-00 E-01 IO-19 NFA-06 NSAE-00
L-03 PM-10 PAP-00 ACDA-12 SP-02 DOEE-00 NRC-00
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P 1509482 SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5274
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS
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E.O. 12356: DECL:OADR
TAGS: ENRG, IPGY, PREP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM
AND GLANDS AS WELL AS A MAJOR DESIGN FAILURE
INVOLVING THE UNEXPECTED TENDENCY OF ITS PRESSURE
TUBES--THE COOLANT CHANNELS THAT CONTAIN
THE FUEL PELLETS IN THE CORE--TO EXPAND IN
LENGTH.) DR. SRINIVASAN RECENTLY TOLD THE
PRESS THAT EVERYTHING POSSIBLE HAD BEEN DONE
TO REPAIR THE LEAK BUT WITH NO SUCCESS.
BECAUSE REPAIR IS NO LONGER CONSIDERED POSSIBLE,
THE ONLY OPTIONS REMAINING ARE TO REPLACE THE
END SHIELD OR WRITE OFF THE REACTOR. (SOME
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ATTEMPTS MAY ALSO BE MADE TO OPERATE THE
REACTOR AT LOW POWER TO PROVIDE STEAM TO THE
NEARBY KOTA HEAVY WATER PLANT.)

B1, A5

COST
RECENT PRESS REPORTS INDICATE THAT IAE IS
CONSIDERING SEALING THE REACTOR AND JUST
LEAVING IT IN POSITION AFTER DRAINING ITS
HEAVY WATER AND REMOVING ITS FUEL. RAPS I
HAS NEVER MADE MONEY AND IT COSTS MORE MONEY EVERY

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THAT IT OPERATES. YET DR. SRINIVASAN SAID THAT THEY STILL WOULD LIKE TO FIX THE REACTOR. NO DOUBT THEY WOULD WELCOME ASSISTANCE, ESPECIALLY WITH THE ROBOTICS NECESSARY. FROM ALL QUARTERS.

B1,A5

43. THE SECOND RAPS REACTOR, HOWEVER, HAS BEEN PERFORMING ADEQUATELY. DURING 1985, RAPS II ACHIEVED A CAPACITY FACTOR OF 57 PERCENT AND AN AVAILABILITY FACTOR OF 71 PERCENT. IT IS SAID TO HAVE ATTAINED ITS 220 MW CAPACITY LAST NOVEMBER. THE DAE HAS RECENTLY PROPOSED TO FUEL THE RAPS REACTOR (AND, POSSIBLY RAPS III AND IV, SCHEDULED FOR COMPLETION IN LESS THAN TEN YEARS) WITH THORIUM-PLUTONIUM FUEL RATHER

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THAN WITH URANIUM. (INSIDE THE REACTOR, THORIUM WOULD BE CONVERTED TO U-233.) DR. P.K. IYENGAR, BARC DIRECTOR, SAID THIS AUGUST THAT BARC HAS ALREADY PRODUCED AND TESTED THORIUM-PLUTONIUM FUEL CLUSTERS. BARC RESEARCHERS PREDICT THESE FUEL CLUSTERS WILL PROVIDE ALMOST TWICE THE ENERGY PER TON AS DOES URANIUM.

B1,A5

44. MADRAS ATOMIC POWER STATION (MAPS)-- INDIAN SCIENCE OFFICIALS ARE VERY PROUD OF THIS ALMOST COMPLETELY INDIGENOUS PLANT. WHEN THEY ARE OPERATING, THE MAPS REACTORS ARE PERFORMING ADEQUATELY. MAPS I, THOUGH, HAS BEEN PLAGUED WITH PROBLEMS. DURING 1985, THE REACTOR ACHIEVED A 46 PERCENT CAPACITY FACTOR AND A 55 PERCENT AVAILABILITY FACTOR, BOTH DOWN ABOUT 15 PERCENTAGE POINTS FROM 1984. VIBRATION IN THE TURBINE GENERATOR CAUSED TWO MAJOR OUTAGES LAST YEAR. IN ADDITION, IN MARCH, THE COIL INSULATION IN THE REACTOR'S MAIN TRANSFORMER FAILED. THE TRANSFORMER WAS REPLACED WITH ONE DESTINED FOR NAROPA. FOUR MONTHS LATER, MAPS I WAS GENERATING POWER AGAIN ONLY TO BE TAKEN OUT THREE DAYS LATER TO CORRECT A LEAKING PUMP. MAPS I IS BACK ON LINE NOW. (DURING THE INITIAL TRIALS

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OF THE NEW CENTRATOR-TRANSFORMER IN JUNE.
THE REACTOR LEAKED SEVEN TONS OF HEAVY
WATER, RESULTING IN A DECLARATION OF AN
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ACTION OES-09

INFO LOG-00 COPY-01 ACS-0# INR-10 EUR-02 SS-0# OIC-02
CIAE-00 E0-00 DODE-00 H-01 IO-10 NEA-06 NSAE-00
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TO SECSTATE WASHDC PRIORITY 5275
INFO AMEMBASSY BEIJING
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AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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VIENNA FOR UNVIE; DEPT PASS DOE

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(IN-PLANT EMERGENCY. ACCORDING TO NAPS OFFICIALS, NO RADIOACTIVITY WAS RELEASED INTO THE ENVIRONMENT.) NAPS II HAS BEEN OPERATING ONLY SINCE LAST OCTOBER AND HAS BEEN IN COMMERCIAL USE ONLY SINCE THIS MARCH. THE SECOND REACTOR APPEARS TO BE OPERATING SOMEWHAT MORE EFFECTIVELY THAN NAPS I. NAPS II WAS OUT OF OPERATION FOR TWO WEEKS IN APRIL AND ONE WEEK IN JULY DUE TO GENERATOR PROBLEMS. IT HAS BEEN SHUT DOWN SINCE AUGUST 12 BECAUSE SOME SPENT NUCLEAR FUEL RODS BECAME STUCK IN THE FUEL TRANSPORT SYSTEM. ALTHOUGH THE TWO REACTORS ARE EACH RATED AT 235 MW, NAPS OFFICIALS ARE FULLY SATISFIED WHEN THE TWO REACTORS GENERATE A COMBINED TOTAL OF 400-420 MW.

45. NARORA ATOMIC POWER PROJECT (NAPP) -- THE TWO 235 MW UNITS UNDER CONSTRUCTION IN UTTAR PRADESH, ABOUT 50 KM FROM THE EPICENTER OF A 1956 EARTHQUAKE, SHOULD BE GENERATING POWER IN 1988 AND 1989, EIGHT YEARS BEHIND SCHEDULE. THIS IS AN UNSAFEGUARDED INDIGENOUSLY DEVELOPED PROJECT ORIGINALLY SCHEDULED FOR COMPLETION IN 1981. DELAYS IN RECEIPT OF INDIA-MADE COMPONENTS AND SITE MODIFICATIONS HAVE ALREADY DOUBLED THE COST OF NAPP FROM 170 MILLION DOLLARS IN 1974 TO 330 MILLION DOLLARS IN 1983. A NEW GENERATOR-TRANSFORMER, TO REPLACE THE ONE TAKEN FOR USE IN NAPS I, SHOULD BE ON SITE BY EARLY NEXT YEAR.

46. KAKRAPAR ATOMIC POWER PROJECT (KAPP) -- THE TWO 235 MW REACTORS UNDER CONSTRUCTION AT KAPP IN GUJARAT ARE EXPECTED TO BE COMMISSIONED IN 1991 AND 1992. THE CALANDRIA FOR UNIT I IS ON SITE AND THE FABRICATION OF END SHIELDS AND CIRCULATING PUMPS IS CONTINUING AS IS THE MAIN PLANT CIVIL WORK. MANUFACTURE OF STEAM GENERATORS AND TURBO GENERATORS SHOULD BEGIN SOON.

47. NEW PROJECTS -- WORK HAS BEGUN ON A NEW SITE AT KAIGA, KARNATAKA, AND ON RAPS III AND IV. EACH SITE WILL HAVE TWO 235 MW REACTORS WHICH ARE DUE TO BE COMMISSIONED IN LESS THAN TEN YEARS. THE SITE SELECTION COMMITTEE REPORT ON ADDITIONAL SITES IS BEING CONSIDERED BY THE GOI. (WE ARE AWARE THAT REQUESTS HAVE BEEN MADE BY WEST BENGAL AND BY KERALA FOR NUCLEAR POWER PLANTS.) A PROJECT REPORT ON FUTURE 500 MW PLANTS IS IN PROGRESS. EMBASSY UNDERSTANDS THAT THE FIRST 500 MW ATOMIC POWER PLANTS WILL BE LOCATED NEAR MADRAS/KALPAKKAM, IN RAJASTHAN, AND AT KAIGA.

48. EARLIER THIS DECADE, THE GOI WAS CONSIDERING A SOVIET OFFER OF TWO 440 MW LIGHT WATER ENRICHED URANIUM REACTORS. THIS PAST AUGUST, THE INDIAN PRESS REPORTED THAT THE GOI HAD OFFICIALLY DECLINED THE SOVIET OFFER. THE DECISION WAS SAID TO HAVE BEEN MADE BEFORE CHERNOBYL AND TO HAVE BEEN BASED ON LOGISTICS AND ON THE INCOMPATIBILITY OF THE SOVIET REACTORS WITH THE INDIAN HEAVY WATER NUCLEAR PROGRAM.

BIAS

HEAVY WATER PLANTS

49. INDIGENOUS HEAVY WATER IS VITAL TO THE DEVELOPMENT OF INDIA'S NUCLEAR ENERGY PROGRAM. REFTEL (C) REPORTED THAT DR. M.R. SRINIVASAN, CHAIRMAN OF THE AEC NUCLEAR POWER BOARD, STATED THAT ONE OF THE MAJOR PROBLEMS THAT

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P 150948Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5276
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
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VIENNA FOR UNVIE; DEPT PASS DOE

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SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

WOULD HAVE TO BE OVERCOME IN ORDER FOR INDIA TO MEET HER GOAL OF 10,000 MW OF INSTALLED NUCLEAR POWER BY THE YEAR 2000 WAS THE PRODUCTION LEVEL OF HEAVY WATER. FOUR OF INDIA'S SIX EXISTING NUCLEAR POWER REACTORS AND ALL OF THE REMAINING ONES THAT WILL BE BUILT THIS CENTURY REQUIRE HEAVY WATER. TO REMAIN FREE FROM SAFEGUARDS, INDIA'S INDIGENOUS NUCLEAR POWER REACTORS MUST USE INDIGENOUSLY PRODUCED HEAVY WATER; IMPORTED HEAVY WATER FROM MOST SOURCES WOULD TRIGGER SAFEGUARDS.

50. GOI AND DAE OFFICIALS REPEATEDLY STATE THAT INDIA IS SELF SUFFICIENT IN HEAVY WATER PRODUCTION AND ONLY IMPORTS HEAVY WATER FOR RAPS FROM THE USSR UNDER AN OPEN AGREEMENT WITH IAEA SAFEGUARDS. DR. SRINIVASAN DECLARED THAT THE MOST RECENT CHARGES THAT DAE WAS ACQUIRING NUCLEAR WEAPONS CAPABILITY, THAT SAFEGUARDED HEAVY WATER HAD BEEN ILLEGALLY DIVERTED TO UN-SAFEGUARDED REACTORS, AND THAT INDIA WAS IMPORTING HEAVY WATER FROM CHINA WERE ALL FALSE. IN SUPPORT, HE EXPLAINED THAT THE MAPS I STARTUP WAS DELAYED ONE YEAR BECAUSE SUFFICIENT HEAVY WATER WAS NOT AVAILABLE ON SCHEDULE.

THE KOTA PLANT BEGAN PRODUCING HEAVY WATER IN 1985. DURING THE PERIOD APRIL 1984 TO MARCH 85, INDIA PRODUCED APPROXIMATELY 80 TONS OF HEAVY WATER. WE ESTIMATE THAT IN THE MOST RECENT FISCAL YEAR [illegible], INDIA ALSO PRODUCED AROUND 80 TONS. PRODUCTION FIGURES SHOULD INCREASE BY ONE-THIRD DURING THE CURRENT FISCAL YEAR TO AN ESTIMATED 110 TONS.

52. FOLLOWING IS A LISTING OF INDIA'S PRESENT AND PLANNED HEAVY WATER PLANTS. THE INSTALLED CAPACITY FIGURES ARE THOSE GIVEN BY MINISTER OF STATE FOR SCIENCE AND TECHNOLOGY, ATOMIC ENERGY, SPACE, ELECTRONICS, AND OCEAN DEVELOPMENT MR. SHIVRAJ V. PATIL TO THE LOK SABHA IN EARLY MAY OF THIS YEAR.

PLANT	DATE OF COMMISSIONING	DESIGN CAPACITY	INSTALLED CAPACITY	ESTIMATED MAXIMUM CAPACITY
NANGAL PUNJAB	1962	14 TONS	14 TONS	12 TONS
TUTICORIN TAMIL NADU	1978	71 TONS	49 TONS	45 TONS
BARODA GUJARAT	1980	67 TONS	45 TONS	35 TONS
KOTA RAJASTHAN	1984	100 TONS	85 TONS	70 TONS
TALCHAR ORISSA	1986	63 TONS	50 TONS	?

B1, A5

51. PRODUCTION OF HEAVY WATER IN INDIA HAS BEEN A SLOW PROCESS. [illegible]

51. Production of heavy water in India has been a slow process. India's heavy water plants continue to face substantial problems resulting from unreliable supply of power and other inputs as well as mechanical breakdown and accidents. In the 12 months from April 1981 to March 82, India produced about 40 tons of heavy water. The following year, production was cut almost in half but it rebounded in 1983 to around 50 tons.

ACTION OES-03

INFO LOG-00 COPY-01 ACS-00 INR-10 EUR-00 OS-00 OIC-02
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L-03 PM-10 EAP-00 ACDA-12 AF-07 DOE-00 IRC-02
SWP-01 CEQ-01 /037 W

P 150948Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5277
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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THAL-VAISHET MAHARASHTRA	1957	110 TONS	- - -	- - -
MANUGURU ANDHRA PRADESH	1978	185 TONS	- - -	- - -
HAZIRA GUJARAT	1988	110 TONS	- - -	- - -
NINTH PLANT	1995	- - -	- - -	- - -
TENTH PLANT	2001	- - -	- - -	- - -

53. IN THIS LISTING OF INDIA'S EXISTING HEAVY WATER PLANTS, ESTIMATED PRODUCTION FIGURES ARE GIVEN.

PLANT	[illegible]FD PRODUCT	
NANGAL, PUNJAB	9 TONS	9 TONS
TUTICORIN, TAMIL NADU	35 TONS	40 TONS
BARODA, GUJARAT	25 TONS	30 TONS
KOTA, RAJASTHAN	15 TONS	30 TONS
TALCHER ORISSA	1 TON	9 TONS

54. NANGAL - THIS PLANT CONTINUES TO OPERATE AT A REDUCED CAPACITY DUE TO A REDUCED SUPPLY OF ELECTRICITY TO ITS ADJOINING FERTILIZER PLANT. CURRENT PLANS CALL FOR REPLACING THIS [illegible] PROCESS WITH [illegible] PROCESS WHICH [illegible] LESS POWER [illegible] IT OPERATING [illegible]

55. KOTA - THIS PLANT ADJOINS RAPS AND DEPENDS ON RAPS FOR ITS STEAM. KOTA USES AN INDIGENOUSLY DEVELOPED BITHERMAL HYDROGEN SULFIDE-WATER EXCHANGE PROCESS FOR PRE ENRICHMENT AND A VACUUM DISTILLATION PROCESS FOR FINAL ENRICHMENT. THOUGH FIRST OPERATED IN JULY 1977, THE PLANT ONLY RAN FOR SIX MONTHS AT MINIMAL CAPACITY PRIOR TO A MAJOR ACCIDENT. THE PLANT WAS RECOMMISSIONED IN 1984 BUT DID NOT START OPERATING AGAIN UNTIL EARLY 85 AND THEN AT REDUCED PRESSURE. SINCE THEN, IT HAS BEEN CLOSED DOWN TWICE FOR HYDROGEN SULFIDE LEAKS, ONE OF WHICH LED TO AN EMPLOYEE DEATH, AND SEVERAL TIMES FOR LACK OF STEAM. TO INSURE A MORE STEADY OPERATION, A STANDBY CAPTIVE STEAM GENERATION UNIT HAS BEEN PROPOSED. IF IT IS COMPLETED ON SCHEDULE AND OTHER PROBLEMS DO NOT OCCUR, THIS PLANT COULD BE PRODUCING AT PEAK CAPACITY IN 1989.

56. TUTICORIN - LINKED TO A FERTILIZER PLANT, TUTICORIN ALSO USES A VACUUM DISTILLATION PROCESS TO ENRICH THE LOW CONCENTRATION PRODUCT, ACHIEVED FROM AN AMMONIA-HYDROGEN EXCHANGE PROCESS, TO NUCLEAR GRADE. THIS YEAR WILL SEE THE REPLACEMENT OF THE PLANT'S CRACKER AND CONVERTER CATALYST. REPORTEDLY THE MAIN PROBLEM FOR THIS PLANT HAS BEEN INCONSISTENT POWER SUPPLY. RAPS 1 AND 11 ARE SUPPOSED TO CORRECT THAT DEFICIENCY AND, TO SOME EXTENT, HAVE DONE SO. TUTICORIN IS PROJECTED TO PRODUCE AT MAXIMUM CAPACITY BY 1988

then should be 10-12 tons per year.

CONFIDENTIAL

ACTION OES-09

INFO LOG-00 COPY-01 ADS-00 INR-10 PM-00 SS-00 OIC-02
CIAE-00 EB-06 DODE 00 H-01 IO-15 NSAE-00 NSAL-00
L 03 PM 10 EAP-00 ACDA-10 IP-00 DOE 00 NRC 02
SNP-01 CEA-01 /067 W

[illegible] -157112 151500Z /23

P 150942Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5278
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

C O N F I D E N T I A L SECTION 13 OF 22 NEW DELHI 22414

VIENNA FOR URVIE, DEPT PASS E3E

E.O. 12356: DECL:OADR
TAGS: ENRG, TRGY, KPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

57. BARODA - THOUGH COMMISSIONED IN 1977, THE PLANT DID NOT START PRODUCING HEAVY WATER UNTIL 1981. PRODUCTION DROPPED IN 1982 BUT SINCE THAT YEAR, HEAVY WATER PRODUCTION HAS INCREASED ANNUALLY AT THIS PLANT. THIS SHOULD CONTINUE THROUGH 1987 WHEN PEAK PERFORMANCE IS EXPECTED. MAJOR ACTIVITY SCHEDULED FOR 1986 INCLUDES REPAIRING THE EXISTING SYNTHESIS GAS COMPRESSOR, INSTALLING AN ADDITIONAL COMPRESSOR, AND AUGMENTING THE REFRIGERATION CAPACITY. BARODA IS ALSO AN AMMONIA-HYDROGEN EXCHANGE PLANT.

58. TALCHER - FROM MARCH UNTIL DECEMBER 1985, THIS PLANT WAS NOT OPERATING DUE TO POWER SHORTAGES AT THE LINKED FERTILIZER PLANT. AFTER FOUR MONTHS OF INTERMITTENT OPERATION, IN APRIL 1986 AN EXPLOSION OCCURRED IN THE PLANT'S CONTROL ROOM, THE LATEST IN A SERIES OF MISHAPS AND DISASTERS THAT HAVE CLOGGED THE PLANT SINCE 1982. THE PLANT WILL BE OUT OF OPERATION UNTIL NEAR THE END OF THIS YEAR. BESIDES NUMEROUS PROBLEMS (E.G., THE FAILURE OF CRITICAL EQUIPMENT, POOR ENRICHMENT), TALCHER APPARENTLY HAS A BASIC PROCESS FLAW--THE POTASSIUM AMIDE CATALYST GETS DEPOSITED EVERYWHERE AND CHOKES THE PIPES AND REACTION TRAYS. THE PLANT THUS RUNS FOR A WHILE AT ABOUT 20 25 PERCENT CAPACITY AFTER WHICH IT COMES TO A COMPLETE HALT DUE TO CHOKING AND OTHER MUTUALLY COMPOUNDING FAILURES. TALCHER IS SUPPOSED TO PRODUCE HEAVY WATER BY THE BITHERMAL AMMONIA-HYDROGEN E CHANGE PROCESS. IT WAS SUPPOSED TO BE FULLY OPERATIONAL BY SEPTEMBER 1985 AT [illegible] AND BY NOW HAVE TWO TONS OF HEAVY WATER. IT WAS SUPPOSED TO COST ABOUT RUPEE 20 MILLION BUT BY THE END OF THE DECADE WILL HAVE COST THREE TIMES THAT FIGURE.

[illegible] - EXECUTION AND PLANNING WORK ARE IN PROGRESS. ALL INDICATIONS ARE THAT INDIGENOUS SUPPLIES ARE ON SITE. OCCASIONAL LABOR PROBLEMS AT THE FABRICATORS' SHOPS HAVE SLOWED WORK ON THE TOWER INTERNALS BUT DAE OFFICIALS STILL EXPECT THE PLANT TO BE FINISHED IN EARLY 1987 AS SCHEDULED. THE PLANT WAS MODELED ON TUTICORIN.

60. MANUGURU - MOST OF THE PLANT'S HEAVY EXCHANGE TOWERS HAVE BEEN ERECTED, MAJOR ITEMS HAVE BEEN ORDERED, AND CIVIL-MECHANICAL CONTRACTS HAVE BEEN AWARDED. THERE WERE DELAYS IN FABRICATION OF THE TOWER INTERNALS AND IN THE DELIVERY OF THE STEAM GENERATOR, BUT DAE OFFICIALS STILL EXPECT THE PLANT TO BE PRODUCING HEAVY WATER IN EARLY 1988. THIS WILL BE THE LAST GAS SULFIDE PLANT IN INDIA DUE TO CONCERN OVER THE ACCIDENT POTENTIAL INVOLVING THE RELEASE OF LARGE AMOUNTS OF HYDROGEN SULFIDE. THE PLANT WAS MODELED ON KOTA BUT UNLIKE THE REST OF INDIA'S HEAVY WATER PLANTS IS NOT TIED TO A FERTILIZER PLANT. A CAPTIVE THERMAL POWER PLANT WILL PRODUCE ALL THE GASES NEEDED FOR HEAVY WATER PRODUCTION AT THE MANUGURU HEAVY WATER PLANT.

61. HAZIRA - CONSTRUCTION OF THIS PLANT HAS BEGUN. THE PLANT, MODELED ON THE THAL PLANT, IS SCHEDULED FOR COMPLETION BY 1988.

FAST BREEDER REACTORS

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ACTION OES-09

INFO LOG-00 COPY-01 ADS-00 INR-10 EUR-00 SS-00 OIC-02
CIAE-00 EB-03 DODE-00 H-01 IO-19 NEA-06 NSAE-00
L-03 PM-10 EAP-00 ACDA-12 [illegible] DOEE-00 NRC-02
SNP-01 CEQ-01 /037 W
------------------157125 151001Z /23

P 150940Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5279
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

C O N F I D E N T I A L SECTION 14 OF 22 NEW DELHI 22414

VIENNA FOR UNVIE; DEPT PASS DOE

E.O. 12356: DECL: OADR
TAGS: ENRG, TRGY, KPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

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62. LOADED WITH 22 INDIGENOUSLY DEVELOPED MIXED PLUTONIUM-URANIUM CARBIDE FULL SUB-ASSEMBLIES, INDIA'S FIRST FAST BREEDER TEST REACTOR (FBTR), LOCATED AT KAPAKKAM, WENT CRITICAL IN OCTOBER, 1985, ONLY 60 DAYS BEHIND SCHEDULE. (THE FBTR IS ABOUT 80 PERCENT INDIGENOUSLY BUILT.) INDIA BECAME THE SEVENTH COUNTRY IN THE WORLD TO OPERATE A BREEDER. LOW POWER PHYSICS EXPERIMENTS WERE CONDUCTED SUCCESSFULLY BEFORE THE REACTOR WAS SHUT DOWN TO PREPARE IT FOR ITS SECOND PHASE OF OPERATION. RECOMMISSIONING OF THE 15 MW REACTOR SHOULD OCCUR LATER THIS YEAR AND POWER OPERATION SHOULD BEGIN A FEW MONTHS LATER. DAE PLANS CALL FOR UPSCALING THIS REACTOR, EVENTUALLY, TO 500 MW.

63. KALPAKKAM WILL BE INDIA'S ONLY CARBIDE FUELED BREEDER; ALL FUTURE BREEDER REACTORS WILL USE METAL FUEL. DAE SCIENTISTS CONSIDER METAL FUEL TO BE THE WAVE OF THE FUTURE. THEY SAY THAT METAL FUELS ARE EASIER TO FABRICATE THAN CARBIDES AND CAN BE REPROCESSED ON SITE. WASTE MATERIAL FROM METAL FUELED BREEDERS IS SOLID AND RELATIVELY EASY TO STORE, AND FAST BREEDER REACTORS USING METAL FUELS CAN PRODUCE MORE AND HIGHER GRADE PLUTONIUM THAN CAN NON-METAL REACTORS.

64. COMMERCIAL FAST BREEDER POWER REACTORS (FBPR) ARE STILL YEARS AWAY. IN 1983 DESIGNS WERE PREPARED FOR 500 MW FBPR [illegible] COST ESTIMATES AT THAT TIME WERE [illegible] MILLION [illegible] POWER REACTOR, [illegible] TO BE COMMISSIONED BEFORE THE YEAR 2000, [illegible] COST OVER [illegible] BILLION [illegible] OF COST [illegible] THE BREEDER [illegible] SYSTEM [illegible] AUTOMATICALLY DROP INTO THE [illegible] CORE [illegible]

STOP THE REACTION. THE BREEDERS WILL NOT USE HEAVY WATER.

65. COMMISSIONING THE FBTR MARKS THE BEGINNING OF THE SECOND PHASE OF THE INDIAN NUCLEAR POWER PROGRAM. DURING THIS SECOND PHASE, PLANS CALL FOR INDIA'S BREEDERS TO USE, AS FUEL, PLUTONIUM FROM THE PRESSURIZED HEAVY WATER REACTORS (OBTAINED BY RE-PROCESSING THE PHWR'S SPENT URANIUM OXIDE FUEL). INSIDE EACH BREEDER, A THORIUM OXIDE BLANKET WILL BE EXPOSED TO RADIATION YIELDING U-233 WHICH IS TO BE THE FUEL FOR THE SECOND GENERATION OF FBR'S IN THE THIRD PHASE OF THE PROGRAM. INDIA HAS VAST RESERVES OF THORIUM OXIDE AND DAE OFFICIALS EXPECT THAT THE THIRD PHASE WILL TAKE CARE OF INDIA'S ENERGY NEEDS UNTIL THE YEAR 2100.

66. TWO FACTORS, HOWEVER, ARE AFFECTING THE ROLE OF BREEDERS IN INDIA'S NUCLEAR FUTURE. FIRST, TESTS TO DATE SHOW THAT IT WOULD TAKE SOME 30 YEARS FOR A FIRST GENERATION BREEDER TO PRODUCE ENOUGH FUEL FOR A SECOND GENERATION BREEDER; THE THORIUM YIELDS ITS U-233 MUCH TOO SLOWLY FOR A VIABLE BREEDER PROGRAM.

67. SECONDLY, EXPERIMENTS IN SWITZERLAND SEEM TO INDICATE THAT A FUTURE FUSION-FISSION HYBRID REACTOR MAY BE ABLE TO PRODUCE U-233 FROM THORIUM IN SIGNIFICANTLY LESS TIME. BARC SCIENTISTS, IN LAUSANNE SINCE 1984,

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ACTION OES-09

INFO LOG-00 COPY-01 ADS-00 INR-10 EUR-00 SS-00 OIC-02
CIAE-00 EB-08 DODE-00 H-01 IO-10 NEA-06 NSAE-00
L-03 PM-10 L/PP-00 SCA-01 SP-02 DODE-00 INRC-02
SNP-01 CEQ-01 /057 W

P 1509452 SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5280
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

C O N F I D E N T I A L SECTION 15 OF 22 NEW DELHI 22414

VIENNA FOR IAEA, DEPT PASS DOE

E.O. 12356: DECL:OADR
TAGS: ENRG, TRGY, NPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

HAVE BEEN WORKING WITH A SWISS ACCELERATOR AND KERALA BEACH THORIUM RODS TO PRODUCE U-233 BY INTENSIVE NEUTRON IRRADIATION. DR. M. SRINIVASAN, HEAD OF BARC'S NEUTRON PHYSICS DIVISION, AND DR. R.R. IYENGAR, BARC DIRECTOR, INDICATED THIS PAST AUGUST THAT THEY HOPE THE NEUTRON ACCELERATOR WILL BE REPLACED AT SOME FUTURE DATE BY A THERMONUCLEAR FUSION PLANT CAPABLE OF BREEDING EVEN LARGER QUANTITIES OF U-233 FROM THORIUM.

68. ACCORDING TO DR. SRINIVASAN, THE IDEA IS ULTIMATELY TO COMBINE A FUSION BREEDER WITH A CONVENTIONAL FISSION REACTOR INTO A FUSION-FISSION HYBRID REACTOR SYSTEM. IN THAT SYSTEM, U-233 WILL BE PRODUCED IN THE FUSION BREEDER AND THIS, ALONG WITH THORIUM, WOULD BE USED AS FUEL IN THE CONVENTIONAL REACTOR TO PRODUCE "NET ELECTRICITY" AFTER MEETING THE POWER DEMANDS OF THE PLANT. HE SAID THAT A SINGLE 750 MW FUSION PLANT SHOULD PRODUCE ENOUGH U-233 TO FUEL 40 RAJASTHAN TYPE REACTORS OPERATING ON A THORIUM U-233 (TH-U233) CYCLE.

69. DAE SCIENTISTS BELIEVE THAT IF THE HYBRID REACTOR CONCEPT BECOMES A REALITY, INDIA'S NUCLEAR TIMETABLE WOULD BE ADVANCED BY 20 YEARS. THE U-233 COULD BE BRED IMMEDIATELY ONCE FUSION NEUTRON SOURCES BECOME AVAILABLE. THIS WOULD ALSO MEAN THAT INDIA WOULD NOT HAVE TO BUILD FBR'S. THE HYBRID REACTOR WOULD BE A SERIOUS ALTERNATIVE TO PLUTONIUM-FUELLED BREEDERS. ADDITIONALLY, BARC EXPERIMENTS HAVE OFTEN FOUND THAT REACTORS BASED ON A TH-U233 CYCLE PRODUCE VERY LITTLE LONG LIVED ACTINIDE WASTES COMPARED TO THOSE PRODUCED BY PLUTONIUM OR URANIUM REACTORS.

RESEARCH REACTORS
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70. THE 100 MW HIGH FLUX RESEARCH REACTOR DHRUVA, INDIGENOUSLY DESIGNED AND BUILT AT BARC, ATTAINED CRITICALITY IN AUGUST 1985. SHORTLY AFTERWARDS, WHILE OPERATING AT 10 MW, SEVERAL OF ITS FUEL RODS BECAME DETACHED. SUBSEQUENTLY, THE REACTOR WAS RUN AT 25 MW AND ITS 129 FUEL RODS WERE DAMAGED BEYOND REPAIR. DURING ITS OPERATION, RADIOACTIVE MATERIAL LEAKED INTO THE HEAVY WATER COOLANT. THESE PAST MONTHS HAVE WITNESSED DHRUVA'S PROJECT ENGINEERS ATTEMPTING, WITH SOME SUCCESS, TO STRAIN THE COOLANT USING A CENTRIFUGE.

B1, A5

JAMSER CHIDAMBARAM V. PATIL STATED IN AUGUST TO THE LOK SABHA THAT DHRUVA'S FUEL CLAMPING MECHANISM HAS TO BE MODIFIED AS A RESULT OF WEAR ON THE ALUMINIUM CLADDING OF THE FUEL PINS. (THIS OCCURRED DURING INTENSE VIBRATION..)

72. (COMMENT. DHRUVA IS A RESEARCH REACTOR AND CAN BE USED AT LOW POWER BY DAE FOR RADIOISOTOPE RESEARCH.

B1, A5

DHRUVA MIGHT BECOME CRITICAL AGAIN

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ACTION OES-09

INFO LOG-00 COPY 01 ADS 00 INR-10 EUR-00 SS-00 OIC-02
CIAE-00 EB-00 DODE-00 H-01 IO-10 NEA-00 NSAE-00
[illegible] SNP-01 CEQ-01 /057 W
[illegible] 151744 151000Z /23

P 150949Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5251
INFO AMEMBASSY BEIJING
AMEMBASSY AHMADABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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VIENNA FOR UNVIE; DEPT PASS DOE

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TAGS: ENRG, TRGY, KPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

THIS YEAR BUT THERE IS NO WAY TO PREDICT WHEN DHRUVA WILL OPERATE AGAIN AT A LEVEL APPROACHING FULL POWER. END COMMENT.)

73. THE ASPARA AND CIRUS REACTORS AT BARC CONTINUE TO OPERATE RELATIVELY BETTER WITH THE 40 MW CIRUS REACTOR COMPLETING 25 YEARS OF OPERATION. THE MAIN ACTIVITIES AT THESE TWO REACTORS INCLUDE RADIATION TESTING OF THORIUM CARBIDE-PLUTONIUM OXIDE FUEL ASSEMBLIES AND RADIOISOTOPE PRODUCTION.

74. ASPARA HAS BEEN SHUT DOWN FOR SOME TIME NOW BECAUSE OF A WATER LEAK IN ITS THERMAL COLUMN. EARLIER THIS YEAR, CIRUS WAS SHUT DOWN FOR EXTENDED MAINTENANCE. IT IS NOW OPERATING AT HALF POWER.

75. [illegible] INDIA'S FIRST U-233 FUELED EXPERIMENTAL [illegible] OPERATION AT BARC [illegible] BEEN [illegible] USED TO [illegible] CONTROL [illegible] BE 30 KW [illegible] BE FUELED BY [illegible] MAY BE COMMISSIONED BY THE END OF THE YEAR.

76. THE POOR OPERATION OF ASPARA, CIRUS, AND DHRUVA HAS LED TO A SHORTAGE OF RADIOISOTOPES AND RADIOPHARMACEUTICALS IN INDIA'S HOSPITALS. [illegible] AND CANCELED AND BARC IS NOW IMPORTING NUCLEAR [illegible] FROM BRITAIN. THESE IMPORTS ARE EXPECTED TO BE NEEDED AT LEAST THROUGH 1988.

REPROCESSING

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77. THE PLUTONIUM PLANT AT TROMBAY CONTINUED TO REPROCESS FUEL DISCHARGED FROM THE CIRUS REACTOR. THE POWER REACTOR FUEL REPROCESSING PLANT (PREFRE) AT TARAPUR COMPLETED REPROCESSING SOME SPENT FUEL BUNDLES FROM RAPP. UNSAFEGUARDED FUEL FROM THE RAPS I REACTOR HAS ALSO BEEN REPROCESSED AT PREFRE TO EXTRACT PLUTONIUM. HOWEVER, TARAPUR SPENT FUEL IS NOT BEING REPROCESSED, ONLY STORED. THIS PLANT IS NOW SHUT DOWN FOR EXTENDED MAINTENANCE.

78. AT THE KALPAKKAM REPROCESSING PLANT, BUILDING CONSTRUCTION, MATERIALS PROCUREMENT, AND PROCESS AND COMPONENT VESSEL FABRICATION ARE ALL PROCEEDING SATISFACTORILY, ACCORDING TO DAE. DAE IS ALSO CONSIDERING A PROPOSAL TO ESTABLISH AN ENGINEERING FACILITY AT BARC FOR PROCESSING IRRADIATED THORIUM FROM THE CIRUS AND DHRUVA REACTORS TO SEPARATE THE U-233.

B1, A5

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ACTION OES-02
INFO LOG-00 COPY-01 ADS-00 INR-10 FMP-00 SS-00 OIC-02
CIAE-00 DE-00 DOTE-00 H-01 IO-10 NEA-06 NSAE-00
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SNP-01 CEC-01 /087 W
----------157232 151005Z /23

P 150942Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5282
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS
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VIENNA FOR UNVIE: DEPT PASS DOE
E.O. 12356: DECL:OADR
TAGS: ENRG, TPGY, KPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM
RADIOACTIVE WASTE MANAGEMENT
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79. DAE ESTIMATES THAT INDIA'S PRIMARY SOLID WASTES AND LOW-LEVEL CONCENTRATES AMOUNT TO MORE THAN 5,000 CUBIC METERS. IN ADDITION, 800 CUBIC METERS OF INTERMEDIATE-LEVEL WASTES AND 450 CUBIC METERS OF HIGH-LEVEL WASTES HAVE BEEN PRODUCED. BY THE TURN OF THE CENTURY, AN ESTIMATED ALMOST 112 THOUSAND CUBIC

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METERS OF PRIMARY SOLID WASTES AND 77,000 CUBIC METERS OF LOW-LEVEL WASTES WILL HAVE BEEN PRODUCED. A FURTHER 20,000 CUBIC METERS OF INTERMEDIATE-LEVEL WASTES AND ABOUT 8,000 CUBIC METERS OF HIGH-LEVEL WASTES WILL HAVE THEN BEEN REPROCESSED.

80. CONSTRUCTION OF THE SOLID STORAGE SURVEILLANCE FACILITY AT TARAPUR IS BEING COMPLETED AFTER EIGHT YEARS AND AT A COST OF ROLS 160 MILLION. THIS FACILITY, WHICH SHOULD BE OPERATIONAL BEFORE THE END OF THE YEAR, WILL STORE FOR UP TO 25 YEARS SOLIDIFIED HIGH-LEVEL RADIOACTIVE WASTE PACKAGES PRODUCED IN THE WASTE IMMOBILIZATION PLANT, ALSO AT TARAPUR. TR. N.S. SUNDER RAJAN.

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HEAD OF BARC'S WASTE MANAGEMENT DIVISION, SAID RECENTLY THAT THE TARAPUR PLANT TAKES CARE OF 120 LITERS PER HOUR OF INTERMEDIATE LEVEL WASTES. MORE THAN 250,000 LITERS HAVE BEEN NEUTRALIZED SO FAR, HE INDICATED.
81. CONSTRUCTION OF THE NAPP WASTE MANAGEMENT PLANT IS AT AN ADVANCED STAGE. THIS PLANT SHOULD BE OPERATIONAL IN 1988. DESIGN WORK HAS BEGUN ON THE WASTE IMMOBILIZATION PLANT AT TROMBAY, SCHEDULED FOR COMPLETION IN 4 YEARS. ADDITIONALLY, AN ALPHA WASTE MANAGEMENT FACILITY FOR FAST BREEDER WASTES HAS BEEN PROPOSED FOR KALPAKKAM: IT IS EXPECTED TO BE OPERATIONAL BY 1993.
LOW LEVEL RADIOACTIVE WASTES WILL CONTINUE TO BE DEPOSITED IN REINFORCED CURRENT CONCRETE
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TRENCHES LOCATED NEAR TAPS, RAPS, MAPS, AND AT TROMBAY.
82. INDIAN NUCLEAR SCIENTISTS ARE ALSO STUDYING THE FEASIBILITY OF DISPOSING OF RADIOACTIVE WASTES UNDERGROUND. AN EXPERIMENTAL RESEARCH STATION HAS BEEN SET UP IN AN UNUSED PORTION OF THE KOLAR GOLD MINES, NEAR BANGALORE, TO EXAMINE THE GEOLOGICAL FORMATIONS.
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NUCLEAR RESEARCH

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83. BHABHA ATOMIC RESEARCH CENTER (BARC), BOMBAY -- THE MAJOR OBJECTIVE OF INDIA'S PREEMINENT NUCLEAR CENTER IS TO PROVIDE RESEARCH AND DEVELOPMENT SUPPORT NEEDED TO SUSTAIN INDIA'S NUCLEAR POWER PROGRAM WITH RESPECT TO CONCEPTS, DESIGNS, MATERIALS, RELIABILITY, AND SAFETY. RESEARCH IS CONDUCTED IN THE FOLLOWING BROAD AREAS: NUCLEAR REACTORS, RADIOISOTOPES, NUCLEAR FUEL CYCLE, METALLURGY, HEAVY WATER, RADIOLOGICAL SAFETY, BASIC RESEARCH, MAGNETOHYDRODYNAMICS, LASERS, FUSION ACCELERATORS, ROBOTICS, AND ELECTRONIC INSTRUMENTATION.
84. INDIRA GANDHI CENTER FOR ATOMIC RESEARCH (IGCAR), KALPAKKAM -- FORMERLY KNOWN AS THE REACTOR RESEARCH CENTER (RRC). THE CENTER IS PRINCIPALLY CONCERNED WITH FAST
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ACTION WSG-00

INFO LOG-00 COPY-01 ADS-00 INR-10 EUR-00 SS-00 OIC-02
DIAE-00 EB-07 SOAE-00 H-01 IO-10 NEA-06 NSAE-00
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SNP-01 CEQ-01 /017 W

P 150948Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5733
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

C O N F I D E N T I A L SECTION 18 OF 22 NEW DELHI 22414

VIENNA FOR UNVIE; DEPT PASS DOE

E O. 12356: DECL:OADR
TAGS: ENRG, TRGY, NPRP, IN
SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

BREEDER REACTOR DEVELOPMENT, FUEL RE-PROCESSING, AND RADIATION SAFETY. IGCAR'S WORK ON BREEDER REACTORS INCLUDES PREPARING DESIGN SPECIFICATIONS, ENGINEERING DEVELOPMENT OF FBTR COMPONENTS, AND METALLURGICAL EVALUATION OF CANDIDATE MATERIALS. ONE LABORATORY WORKS ON DEVELOPING FAST REACTOR FUEL REPROCESSING TECHNIQUES AND ON DESIGNING THE FAST REACTOR PART OF THE KALPAKKAM REPROCESSING PLANT.

25. CENTER FOR ADVANCED TECHNOLOGY (CAT), INDORE -- A CENTER FOR RESEARCH AND DEVELOPMENT IN THE AREA OF LASERS, ACCELERATORS, AND FUSION, CAT WILL INITIALLY WORK TO DEVELOP A COPPER VAPOR LASER AND A TRANSVERSE FLOW HIGH POWER CARBON DIOXIDE LASER. ABOUT 20 SCIENTISTS AND 20 TECHNICIANS HAVE OCCUPIED THE 3235 SQUARE METERS OF LABORATORY SPACE COMPLETED SO FAR; ONE HUNDRED ARE SCHEDULED TO BE WORKING HERE BY THE END OF THE YEAR AS MORE ACTIVITIES ARE SHIFTED TO CAT FROM BARC. A HOUSING COMPLEX HAS BEEN COMPLETED AND TWO WORKSHOPS ARE UNDER CONSTRUCTION. PLANS ARE ALSO UNDERWAY TO BUILD A PROTON SYNCHROTON AND A HIGH ENERGY ELECTRON ACCELERATOR AT CAT.

26. THREE OTHER CENTERS ROUND OUT INDIA'S NUCLEAR RESEARCH FACILITIES. THE TATA INSTITUTE OF FUNDAMENTAL RESEARCH, BOMBAY, CONDUCTS THEORETICAL WORK IN VARIOUS FIELDS OF MATHEMATICS, NUMERICAL METHODS, AND PHYSICS, FOCUS ON NUCLEAR AND ATOMIC PHYSICS. THE [illegible]

SAFETY

27. THE ATOMIC ENERGY REGULATORY BOARD (AERB) [illegible] INDEPENDENT SAFETY REGULATORY BODY TO ENSURE THE SAFETY OF ALL NUCLEAR INSTALLATIONS. THE AERB CAN ORDER CLOSURE OR STOPPAGE OF A UNIT IF IT IS POSING RADIATION HAZARDS. THE BOARD WAS ESTABLISHED IN LIGHT OF NUMEROUS REPORTS OF RADIATION LEAKS AND OTHER PROBLEMS [redacted]

BIAS

FOR EXAMPLE, IN AUGUST 1986, MINISTER SHIVRAJ V. PATIL TOLD THE LOK SABHA THAT THERE HAD BEEN NO INCIDENTS INVOLVING RADIATION LEAKAGE IN ANY INDIAN ATOMIC POWER PLANT WHICH HAD CAUSED PHYSICAL DAMAGE TO ANY WORKERS OF THE PLANT. YET IN MAY 1983, THE AEC RELEASED SOME RECORDS OF THE TARAPUR RADIATION LEAK ONLY ON THE CONDITION THAT NO CHARGE SHEET COULD BE BROUGHT AGAINST THE DAE BY THE AFFECTED WORKERS ON THE BASIS OF THE RELEASED INFORMATION. THE REPORT ADMITTED THAT 328 WORKERS HAD BEEN EXPOSED TO RADIATION EXCEEDING, SOME BY MORE THAN 4 TIMES, INTERNATIONALLY-ACCEPTED NORMS.

28. DURING THE 1980'S, A NUMBER OF DIFFERENT SAFETY PROBLEMS IN INDIA'S NUCLEAR PROGRAM SURFACED IN THE PRESS AND IN OTHER REPORTS. A PARTIAL LISTING FOLLOWS:

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ACTION OES-09

INFO LOG-00 ADS-00 INR-10 EUR-00 SS-00 DIC-02 CIAE-00
EB-06 DODE-00 H-01 IO-10 NEA-06 NSAE-00 L-03
PM-10 EAP-00 ACDA-12 SP-02 DOEE-00 NRC-02 CNP-01
CEQ-01 /066 W
----------203832 151846Z /23

P 150943Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5784
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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VIENNA FOR UNVIE; DEPT PASS DOE

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SUBJ: INDIA'S NUCLEAR ENERGY PROGRAM

1980

MAJOR LEAK IN PRIMARY COOLANT PIPE AT TAPS.
MAJOR LEAK OF CONTAMINATED WATER AT TAPS.

1981

RADIATION LEAK AT RAPS.

1982

COMBUSTIBLE NUCLEAR FUEL SCRAP FOUND BY
CHILDREN AT THE NUCLEAR FUEL COMPLEX, HYDERABAD

1983

EXCESSIVELY HIGH RADIATION LEVELS AT TAPS
AND RAPS ADMITTED BY DAE, NEARLY THE HIGHEST
EVER RECORDED IN ANY OF THE WORLD'S NUCLEAR
POWER STATIONS.

1984

ENGINEER DIES FROM H2S GAS LEAK AT THE KOTA
HEAVY WATER PLANT.

1985

FIRE IN REACTOR BUILDING AT RAPS II.

1986

EXPLOSION AND FIRE AT TALCHER HEAVY WATER PLANT.
FUEL LEAK CONTAMINATED HEAVY WATER AT RAPS.

89. IN AN AUGUST PRESS INTERVIEW,
INDIAN AERB CHAIRMAN DR. ARUN KUMAR DE
EXPLAINED THAT THE AERB'S MANDATE IS TO
OVERSEE THE SAFETY ASPECTS OF ALL FACETS
OF INDIA'S NUCLEAR POWER STATIONS--SITE
SELECTION, DESIGN, CONSTRUCTION, COMMISSIONING,
OPERATION, ETC. HE SAID THAT THE CHANCES OF
A MAJOR ACCIDENT IN ANY NUCLEAR POWER REACTOR
IN INDIA ARE VERY REMOTE DUE TO THEIR
DESIGNED AND ENGINEERED SAFETY PRECAUTIONS,
THEIR "DEFENSE IN DEPTH", AND BECAUSE THE
STATIONS ARE RUN BY TRAINED AND EXPERIENCED
ENGINEERS AND SCIENTISTS.

B1, A5

WE HAVE REPORTED SIMILAR POST-CHERNOBYL
INTERVIEWS AND ASSURANCES WHICH HAVE BEEN
GIVEN IN THE PRESS BY DR. RAJA RAMANNA AND
DR. M.R. SRINIVASAN AND IN PARLIAMENT BY
RAJIV GANDHI AND SHIVRAJ V. PATIL.

90. SOME OF THE SAFETY ASPECTS OF THE INDIAN
NUCLEAR PROGRAM INCLUDE:

-- A DOUBLE CONTAINMENT SYSTEM FOR ALL FIRST
GENERATION REACTORS BEGINNING WITH RAPS;

-- QUALIFIED NUCLEAR ENGINEERS AT EVERY REACTOR
ON EVERY SHIFT;

-- SPREADING OVEREXPOSURE TO RADIATION AMONG
PLANT PERSONNEL SO THAT NO SINGLE WORKER
EXCEEDS THE MAXIMUM ALLOWABLE LIFETIME DOSE
(WHICH COULD BE ONE OF THE REASONS FOR
INCREASINGLY GLOWING REPORTS OF INDIA'S
NUCLEAR POWER PROGRAM);

-- PLANT OPERATOR EMERGENCY PLANS AND

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INFO LOG-00 ADS-00 INR-10 EUR-00 SS-00 OIC-02 CIAE-00
EB-08 DODE-00 H-01 IO-10 NEA-06 NSAE-00 L-03
PM-10 EAP-00 ACDA-12 SP-02 DOEE-00 NRC-02 SNP-01
CEQ-01 /086 W
----------203121 151848Z /23

P 150946Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5285
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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PERIODIC DRILLS;

-- AN EMERGENCY ACTION PLAN FOR THE AREA SURROUNDING EACH PLANT;

-- ONE GENERATOR LOCATED NEAR EACH REACTOR TO INSURE EACH REACTOR'S SAFETY SYSTEM IS SUPPLIED WITH ENERGY (BEGINNING WITH MAPS, A THIRD GENERATOR IS BEING INSTALLED WHICH CAN OPERATE WITH EACH REACTOR);

-- A ONE MILE RADIUS EXCLUSION ZONE AROUND EACH REACTOR WITH AN ADDITIONAL THREE MILE RADIUS ZONE WHERE NO POPULATION GROWTH IS PERMITTED;

-- RADIATION TESTS ON SOIL, VEGETATION, FISH, MILK, ETC. CONDUCTED IN THE AREAS AROUND THE POWER STATIONS;

-- A QUANTITY OF IODINE AT EACH PLANT;

-- TRANSPORTATION OF SPENT FUEL BY RAIL IN SEALED CONTAINERS TO THE TARAPUR PROCESSING PLANT;

-- COMPUTER CONTROLLED REACTOR OPERATING SYSTEMS (ALTHOUGH APPARENTLY WITHOUT SAFETY CODES, WRITTEN IN THE PROGRAMS, WHICH SENSE CRITICAL SITUATIONS AND INITIATE CORRECTIVE ACTION).

91. ONE SAFETY ISSUE WHICH CONTINUES TO RECEIVE PLAY IN PARLIAMENT AND THE PRESS IS THE SAFETY OF NUCLEAR PLANTS SITED IN EARTHQUAKE ZONES. MUCH OF THIS TYPE QUESTIONING DEALS WITH NARORA WHICH, IN ADDITION TO BEING IN AN EARTHQUAKE ZONE, IS SITUATED NEXT TO THE GANGES RIVER. NARORA DETRACTORS SAY THE SITE HAS NO FIRM FOUNDATION--THE WATER TABLE IS LESS THAN 15 METERS BELOW GROUND AND THERE IS NO ROCK EVEN TO A DEPTH OF 300 METERS. THERE IS SOME QUESTION AS TO WHETHER ITS SITE WAS SELECTED BEFORE OR AFTER SEISMIC STUDIES WERE DONE. SOME PEOPLE ARE AFRAID THAT AN EARTHQUAKE WILL CAUSE THE PLANT TO BREAK OPEN AND SPEW RADIOACTIVE MATERIAL INTO THE RIVER (THUS MAKING IT EVEN MORE POLLUTED THAN IT IS NOW.)

92. THE TYPICAL INDIAN OFFICIAL RESPONSE CONTAINS THE FOLLOWING ELEMENTS. FIRST, TWO-THIRDS OF THE INDIAN SUBCONTINENT IS IN THE SEISMIC ZONE AND THE ENTIRE INDO-GANGETIC PLANE IS SEISMICALLY ACTIVE. IF DAE WAS TO AVOID SEISMIC ZONES, REACTORS COULD ONLY BE LOCATED IN THE DECCAN PLATEAU IN THE SOUTH. THIS WOULD FORCE THE ENTIRE OF NORTH INDIA TO RELY ON HYDROELECTRIC AND COAL FOR ELECTRICITY, SOURCES WHICH ARE NOT EVENLY DISBURSED IN THE REGION AND WHICH DO NOT MEET THE DEMAND FOR COMMERCIAL POWER NOW, MUCH LESS IN THE FUTURE. SECONDLY, INDIA'S NUCLEAR PLANTS HAVE BEEN DESIGNED TO BE SAFE IN SEISMIC ZONES. THEY WILL COME TO A SAFE SHUTDOWN CONDITION AT 0.3G HORIZONTAL GROUND ACCELERATION AND CAN KEEP OPERATING AT 0.15G. THE NARORA PLANTS HAVE BEEN DESIGNED TO WITHSTAND AN EARTHQUAKE OF 6.7 ON THE RICHTER SCALE. THIRDLY, THE CASE OF JAPAN, A VERY EARTHQUAKE-PRONE COUNTRY WITH A RAPIDLY INCREASING NUMBER OF NUCLEAR PLANTS, IS USED TO SHOW THAT NUCLEAR PLANTS IN EARTHQUAKE PRONE AREAS CAN BE SAFE.

INDO-US NUCLEAR COOPERATION

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INFO LOG-00 ADS-00 INR-10 EUR-00 EB-00 OIC-02 CIAE-00
EB-08 DODE-00 H-01 IO-10 NEA-06 NUAE-00 L-03
PM-10 EAP-00 ACDA-12 SP-02 DOEE-00 NRC-02 SNP-01
CEQ-01 /030 W
----------203126 151849Z /23

P 150948Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5286
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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B1,1.5

96. BARC HAS BEEN CONDUCTING SIGNIFICANT RESEARCH INTO NUCLEAR FUELS IN ORDER TO, BROADLY SPEAKING, MAXIMIZE THE USE OF INDIAN THORIUM, FIND WAYS TO USE THE ACCUMULATING SAFEGUARDED PLUTONIUM FROM RAPS, BECOME EVEN MORE SELF-RELIANT AND KEEP OUT FROM UNDER IAEA SAFEGUARDS.

B1,A5

THIS RESEARCH MAY ALSO IMPACT ON INDIA'S BREEDER PROGRAM. BY THE END OF THE DECADE, WE SHOULD BE BETTER ABLE TO TELL WHETHER THESE EXPERIMENTS WILL BENEFIT INDIA'S NUCLEAR PROGRAM AS MUCH AS DAE SCIENTISTS NOW HOPE.

B1,A5

98. WE PROJECT INDIA'S FUTURE HEAVY WATER PRODUCTION TO INCREASE AROUND 30 TONS

B1,A5

94. IN ADDITION, THERE ARE SEVERAL ONGOING INDO-US COLLABORATIVE PROJECTS IN BASIC NUCLEAR PHYSICS TOTALING ALMOST ONE HALF MILLION DOLLARS IN US FUNDING. DR. RAJA RAMANNA HAS EXPRESSED HOPE THAT INDO-US NUCLEAR RESEARCH CAN BE CARRIED OUT AT CAT-INDORE SINCE THAT FACILITY WILL BE SEPARATED FROM INDIA'S NUCLEAR ENERGY FACILITIES.

B1,A5

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ACTION OES-09

INFO LOG-00 ADS-00 PM-10 EUR-06 CS-00 OIC-02 CIAE-00
EB-08 DODE-00 H-01 IO-10 NEA-06 NSAE-00 L-03
PM-10 EAP-00 ACDA-12 SP-02 DOEE-00 NRC-02 SNP-01
CEQ-01 /036 W
----------203117 151848Z /23

P 150948Z SEP 86
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC PRIORITY 5287
INFO AMEMBASSY BEIJING
AMEMBASSY ISLAMABAD
AMEMBASSY OTTAWA
AMEMBASSY PARIS
AMEMBASSY VIENNA
AMCONSUL BOMBAY
AMCONSUL CALCUTTA
AMCONSUL MADRAS

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VIENNA FOR UNVIE; DEPT PASS DOE

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ANNUALLY FOR THE NEXT FEW YEARS. THIS PRODUCTION SHOULD ENABLE DAE TO BRING NAPP AND KAPP ON LINE AS SCHEDULED (1986-1992) WITHOUT RESORTING TO HEAVY WATER IMPORTS OR TO ILLEGAL DIVERSION OF SAFEGUARDED HEAVY WATER.

99. WE BELIEVE, NEVERTHELESS, THAT RAMANNA IS BEING OVERLY OPTIMISTIC WHEN HE PREDICTS THAT BY THE YEAR 2000 INDIA WILL HAVE 10,000 MW OF INSTALLED NUCLEAR POWER CAPACITY. WE DO NOT DOUBT THOUGH THAT BY THAT TIME INDIA WILL HAVE 10,000 MW UNDER CONSTRUCTION. INDIA'S SCIENTIFIC KNOWHOW AND DESIGN EXPERTISE ARE AMONG THE WORLD'S BEST. AS INDIA'S INDUSTRIALIZATION CONTINUES, PLANT CONSTRUCTION TIME SHOULD MARKEDLY DECREASE AND THE QUALITY OF INDIAN-MADE PARTS SHOULD IMPROVE AS WELL.

100. SINCE THE FIGURE OF 10,000 MW WAS SAID TO HAVE BEEN SELECTED AS THE MINIMUM LEVEL NECESSARY TO FUEL A SELF-SUSTAINING BREEDER CYCLE DURING THE SECOND PHASE OF INDIA'S NUCLEAR POWER PROGRAM, IF NUCLEAR FUEL RESEARCH ELIMINATES THE NEED FOR BREEDERS, THAT GOAL AND THE REASONS FOR REACHING IT BECOME LESS IMPORTANT. TO THE EXTENT THAT FUSION-FISSION HYBRID REACTOR RESEARCH APPEARS MORE PROMISING, EMPHASIS ON ATTAINING 10,000 MW BY THE YEAR 2000 WILL DECREASE; MORE EMPHASIS IS LIKELY TO BE PLACED ON BUILDING AND OPERATING THE PLANTS THAT TIME AND CIRCUMSTANCES PERMIT RATHER THAN ON GOAL ATTAINMENT.

101. INDIA'S PROGRESS IN ITS NUCLEAR PROGRAM WILL GO HAND-IN-HAND WITH ITS INDUSTRIAL DEVELOPMENT. THEIR NUCLEAR PROGRAM IS NOT SUFFERING FROM A LACK OF KNOWHOW OR FROM A LACK OF TECHNICALLY SOPHISTICATED SCIENTISTS AND ENGINEERS BUT MORE FROM POOR PRACTICES OF PRODUCTION AND MAINTENANCE. NEVERTHELESS, THERE SHOULD BE NO DOUBT THAT THE GOI AND THE DAE ARE FULLY COMMITTED TO SUBSTANTIALLY INCREASING INDIA'S NUCLEAR POWER CAPACITY AND JUST AS FULLY COMMITTED TO DOING SO INDIGENOUSLY. THOUGH PROBLEMS WILL CONTINUE TO HINDER DAE ACCOMPLISHMENT OF THESE GOALS, GOOD PROGRESS HAS BEEN MADE, THE PROBLEMS ARE BEING ADDRESSED, AND THE FUTURE HOLDS PROMISE OF SUBSTANTIAL ACHIEVEMENT. END COMMENT.
DEAN